

Forested Vegetation - Limber Pine

Limber Pine (*Pinus flexilis* James) (Nelson and Hartman, 1984) covers about 2% of the forested acres on the Bighorn National Forest (cvu database). Limber pine is a relatively unstudied species in the Big Horn mountain section.

The most significant item concerning limber pine in the Big Horn mountain section is white pine blister rust, *Cronartium ribicola*. The picture below shows the effect in Tensleep Canyon in October 2001. The red, dead trees are almost entirely limber pine.



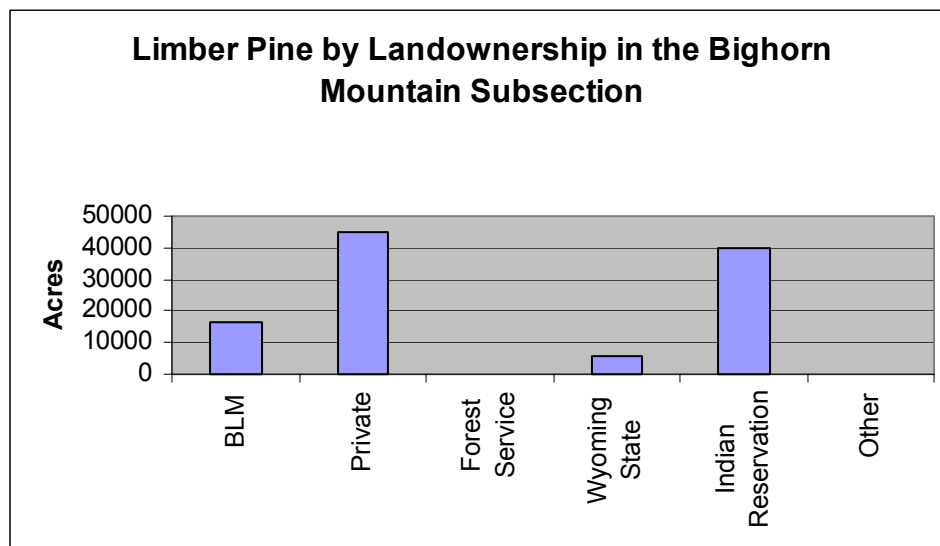
COMPOSITION

White pine blister rust is not native to North America. The intermediate host is *Ribes* sp. Current surveys show that it is widespread in Tensleep Canyon, but it is also known on the opposite side of the National Forest in Tongue Canyon and Goose Creek drainages. White pine blister rust can have serious effects upon limber pine forests, such as in Montana and southern Alberta, where over a third of the limber pine trees are dead and 90% of the remaining live trees are infected (Kendall, 1998, as cited in Meyer and Knight, DRAFT, 2001).

Table C1 shows the distribution of limber pine forests across land ownerships in the Bighorn Mountain subsection. This is GAP data, and does not match acres with the CVU cover type data, but the percentage by ownership is the important piece of this table. The two percent of the Bighorn NF with a limber pine cover type does not show

up in the GAP cover type classification. The Bighorn National Forest manages a very small portion of the limber pine cover type in this ecological section.

Table C1. Limber Pine Cover Type Landownership - Big Horn Mountain Section



Major species/plant associations

Limber pine is considered to be seral to Douglas-fir on the Bighorn National Forest (Hoffman and Alexander, 1976). Some authors have listed limber pine as an edaphic climax on windswept, dry, rocky soils and ridges – see the potential natural vegetation section for a description of this limber pine climax forest.

Successional Pathways, patterns

Limber pine is primarily restricted to the lower elevation areas in the Big Horn mountains, in or near the same elevations as Douglas-fir and ponderosa pine. However, individual limber pine are known to exist at up to 10,000 feet, miles from the next nearest limber pine (Bornong, personal observation), because of seed distribution by Clark's nutcracker, *Nucifraga columbiana* (Knight, 1994).

Differences in composition among stratification units

Table C2 shows the almost complete affinity limber pine has for sedimentary substrates in the Bighorn National Forest.

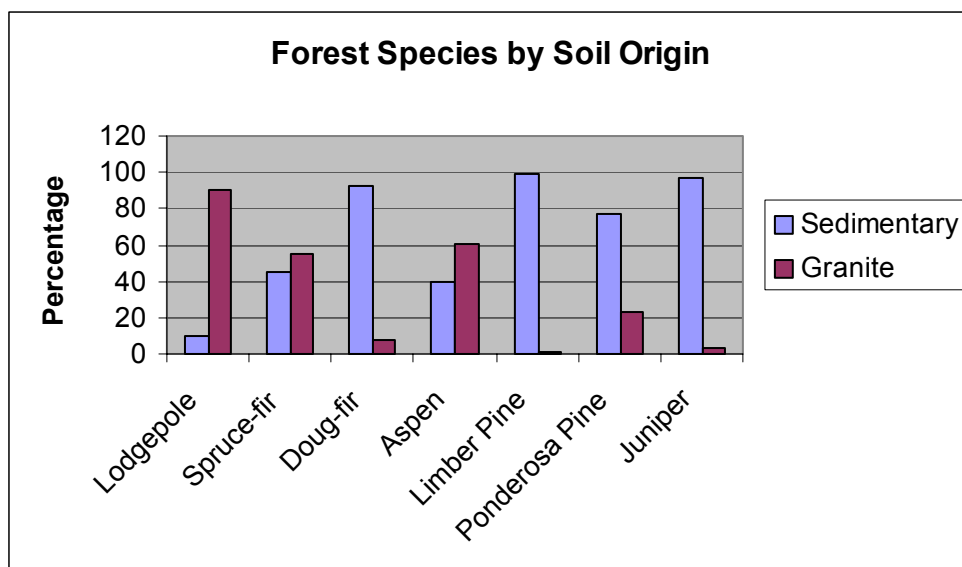
Changes in species composition/anthropogenic influences/departures from HRV

Limber pine is not a commercial wood species, so there has been little to no effect from timber harvest.

The fire regime, although little studied in the Big Horn mountains, is suspected to be intermediate to the lower elevation ponderosa pine and the higher elevation subalpine regimes. The return interval may have averaged 50 to 100 years, and it is likely that both surface and crown fires occurred. Human fire suppression over the past 100 years is possibly just beginning to have an effect upon this species.

As discussed above, white pine blister rust is clearly the most significant anthropogenic effect upon limber pine in the Big Horn mountains.

Table C2. Forest Cover Types by Soil Substrate Origin – Bighorn National Forest



STRUCTURE AND FUNCTION

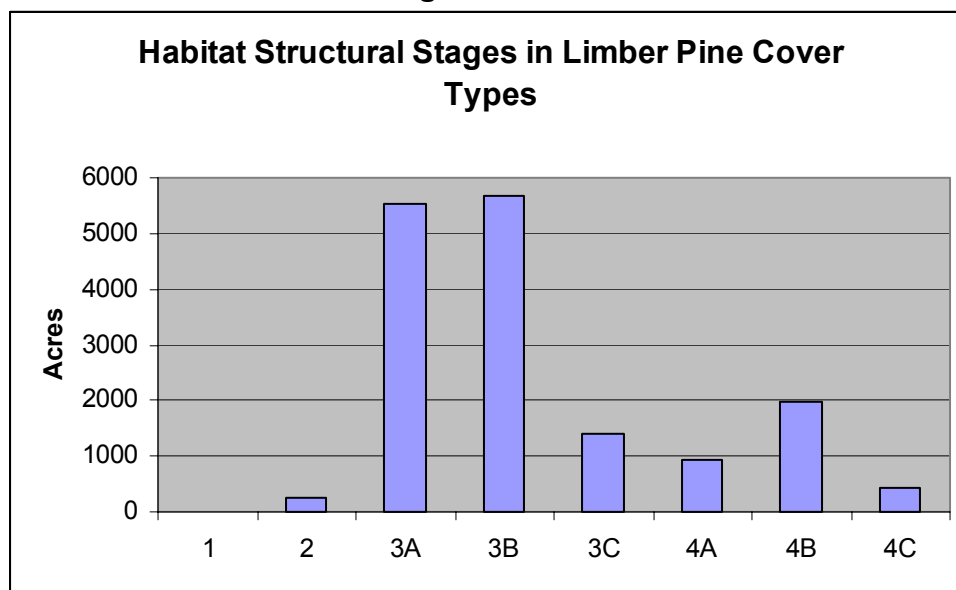
Habitat Structural Stage descriptions

Habitat structural stage provides a “coarse filter” look at habitats provided by forests. It gives an indication of forest size and density, which can be interpreted for wildlife habitat suitability. Forested stands provide an infinite variety of tree sizes and canopy densities, and to consider the amount, type, and spatial distribution of wildlife habitats, people need a simplified system to comprehend this variety. Many habitat considerations, such as amount and type of understory vegetation; size and amount of snags and coarse woody debris; and, the amount of hiding cover provided, can be approximately inferred from the broad habitat groupings described in the habitat structural stage model.

Table C3 shows that the 3A and 3B structural stages cover the most acres in the current limber pine cover type.

Table C3. Limber Pine Cover Type Wildlife Habitat Structural Stages

in the Big Horn Mountains



Data from Bighorn NF CVU database, 11/01. Includes all lands covered by CVU database.

Habitat structural stages are defined in Hoover and Wills (1987). Structural stages describe the developmental stages of tree stands in terms of tree size and the extent of canopy closure. Structural stages can be considered a descriptor of the succession of a forested stand from regeneration, or bare ground, to maturity. For the purposes of describing wildlife habitat, forest structural stages are divided into four categories, consisting of Stage 1, grass/forb; Stage 2, shrub/seedling; Stage 3, sapling/pole; and Stage 4, mature, Table C4. It is important to recognize that structural stages represent succession in *forested stands* only; the grass/forb, structural stage 1, refers only to forested stands that have undergone a stand replacing event, and are temporarily in a “non-forested” condition. Structural Stage 1 does not include naturally occurring meadows. The letter in the structural stage naming convention (a, b, or c) refers to the crown density, Table C4.

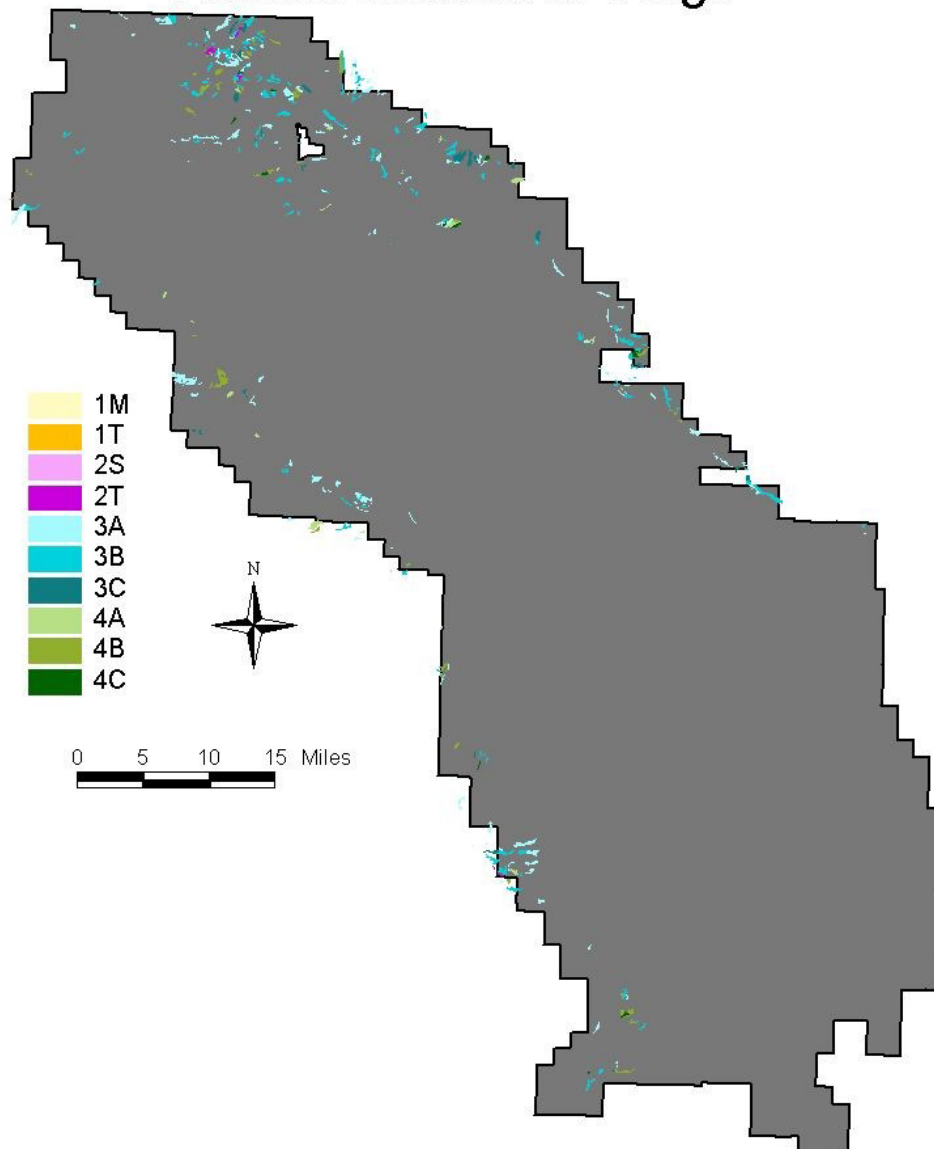
Table C4. Habitat Structural Stage Definitions, Hoover and Wills 1987

Habitat Structural Stage	Diameter	Crown Cover %	Habitat Structural Stage	Diameter	Crown Cover %
1	Not applicable	0-10%	3C	1 – 9 inches	70-100%
2	< 1 inch	10-100%	4A	9+ inches	10-40%
3A	1 – 9 inches	10-40%	4B	9+ inches	40-70%
3B	1 – 9 inches	40-70%	4C	9+ inches	70-100%

The following map shows the distribution of limber pine by habitat structural stage for the Bighorn National Forest.

Limber Pine

Habitat Structural Stage



Expected Range of Snag Structure

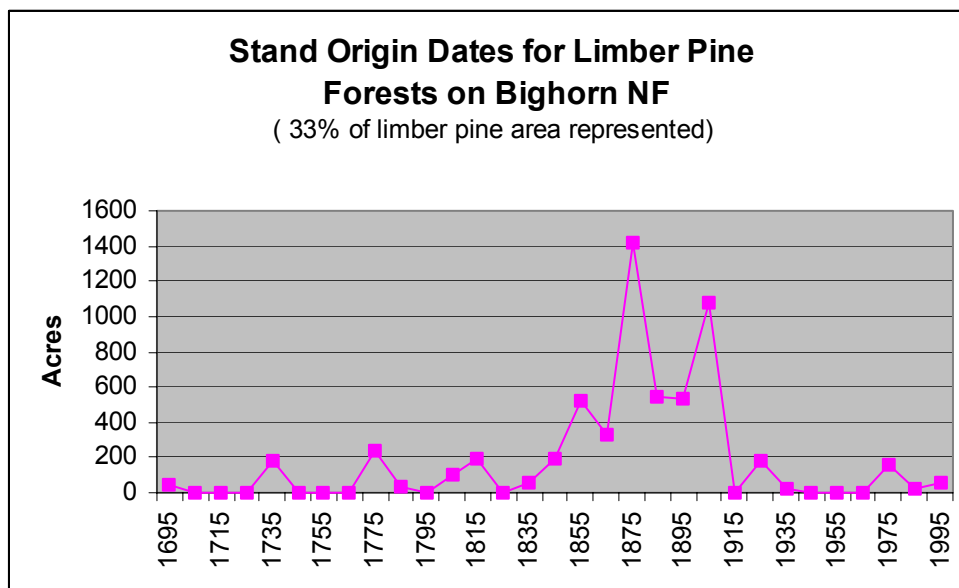
Because of white pine blister rust, it is almost certain that current snag levels, particularly in areas of heavy infection, are well above natural levels.

Old Growth Characteristics

Limber pine is not described in Mehl (1992). Little is known about limber pine old growth on the Big Horn mountains. Most of the mature limber pine in the Bighorn National Forest is in the 8 to 12" dbh category, although some trees range up to 20" inches dbh. One exceptional limber pine is known to exist near the Meadowlark Lake dam. It is 48" dbh and approximately 80 feet tall (Bornong, personal observation). It is rotten up to at least 16 feet, with what are apparently squirrel nests in the cavity. This tree was first observed in 1981, and was most recently visited in 2001.

Table C5 shows the origin dates for the limited amount of limber pine stands on the Bighorn NF with data. A possible explanation for the distribution shown is that a significant portion of the existing limber pine originated following fires in the later half of the 19th century.

Table C5. Stand Origin Dates for Limber Pine on the Bighorn National Forest



Canopy Closure

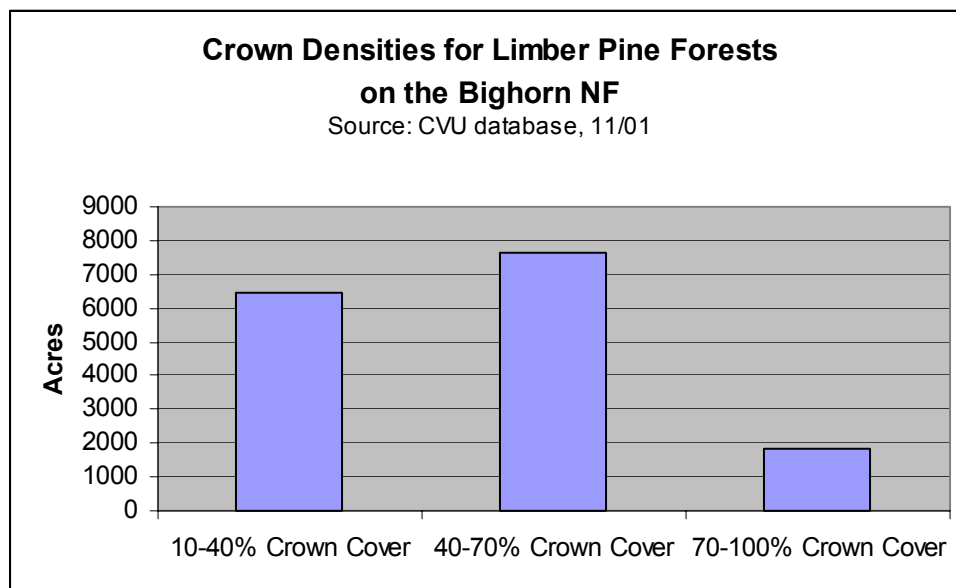
Table C6 shows the crown densities for limber pine stands on the Bighorn National Forest. This table is from the CVU database, and includes all limber pine stands in the habitat structural stage 3 and 4 size classes.

Patchiness

The map above gives an idea of the natural patchiness that exists between limber pine stands on the Bighorn National Forest. The entire distribution of this tree is not that finite, as it occurs mixed with Douglas-fir and Engelmann spruce/subalpine fir.

Individual trees can exist where individual seeds may have been planted by Clark's nutcracker. An example of this is "Lone Tree Spring" in the south west corner of the Bighorn National Forest, where a lone limber pine exists in a sagebrush meadow at least one-quarter mile from the nearest tree.

Table C6. Crown Densities for Limber Pine Forests on the Bighorn National Forest



Vertical Complexity

Limber pine on the Bighorn NF rarely occurs as uniformly distributed, single story, single species stands. More typically, it is mixed with spruce/fir or Douglas-fir, which provides vertical complexity. Likewise, in most pure limber pine stands, it occurs in low densities (A or B structural stages), with grass and/or sagebrush intermixed.

Changes in structure/anthropogenic influences

This is discussed above.